Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Initially, although the Office Action indicates that claims 1-7 are pending in the application, claim 8 was added in the Preliminary Amendment filed with the present application on June 24, 2005, considering that claim 4 was amended to depend only from claim 2.

Claim 2 has now been amended to recite a firing temperature of 300 to 600°C, based on the disclosure in the last line on page 5 of the specification.

Claims 3, 4 and 8 have been cancelled.

New claims 9 and 10 have been added to the application.

New claim 9 has an upper limit of 475°C for the firing temperature. Although this temperature is not specifically set forth in the specification, it is apparent that since Applicants had possession of the invention with a firing temperature range of 300 to 600°C at the time of the present invention, they also had possession of the invention with a firing temperature range of 300 to 475°C. See *In re Blaser*, 194 USPQ 122.

New claim 10 has an upper limit of 400°C for the firing temperature range. In addition to the foregoing remarks with respect to claim 9, Applicants also note that 400°C is the firing temperature range in each of Examples 1-3 in the present application.

The patentability of the presently claimed invention over the disclosure of the reference relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1-7 under 35 U.S.C. §103(a) as being unpatentable over Yamamoto et al. (USP 5,132,104; hereinafter "Yamamoto") is respectfully traversed.

The electroconductive zinc oxide powder of claim 1 is different from the complex of zinc carbonate of Yamamoto in the following respects:

(1) Particle size

The complex of Yamamoto has a needle shape, and has an average length of 5 to 100 μm and average thickness of 0.05 to 10 μm (please see claim 1 of the reference).

It is common general technical knowledge that a secondary aggregate consisting of primary particles is unshaped and cannot have a needle shape. In addition, the complex of Yamamoto obviously has a crystal form, as apparent from Figs. 1 to 3, even though the term "crystal" is not specifically recited in the reference. Therefore, the complex of Yamamoto which has a crystal form cannot be a secondary aggregate, and cannot be easily dissociated anymore.

On the other hand, the average primary particle size of the powder of the present invention is 0.03 μm or less, which is much smaller than that of a conventional secondary aggregate, as is clear from Figs. 1 and 2 of the present application.

The average primary particle size of the present invention, 0.03 μm or less, is even smaller than the average thickness of the complex of Yamamoto, i.e. 0.05 to 10 μm.

Thus, the electroconductive zinc oxide powder of the present invention is distinctly different from the complex of Yamamoto in the average primary particle size.

(2) Bulk density

The bulk density of the powder of the present invention is 0.20 g/mL or less.

The bulk density is not described in Yamamoto. However, the bulk density of the complex of Yamamoto cannot be as small as that of the present invention, since the production methods are different as between the present invention and the reference, as will be discussed below.

(3) Effect

The bulk density of the powder of the present invention is relatively small, and primary particles are loosely aggregated in the powder.

Accordingly, the powder is easily dissociated when incorporated into a base material such as rubber or resin. In addition, the size of the obtained primary particle is very small.

As the result, the primary particles are finely and evenly dispersed in a base material, and a composition having a very small volume resistivity is obtained (please see page 8, line 9 to page 9, line 14 of the present specification).

The superior dispersibility and low volume resistivity is demonstrated by the Examples, with particular reference to Tables 1-3 in the specification.

On the other hand, the complex of Yamamoto, having a crystal form, cannot be dissociated anymore, if the complex is not destroyed, and the size of the complex is much bigger compared to that of the present invention. Therefore, the complex of Yamamoto cannot be finely dispersed in a base material such as rubber or resin.

The volume resistivity described in Yamamoto (Tables 5 and 6) is smaller than that of the present invention (Tables 2 and 3). However, they cannot be directly compared, since their measuring methods are different. But at least, a comparison between the powder of the present invention and the powder outside of the present invention is made in the Examples in the present specification, demonstrating superior effect of the powder having the average primary particle size and bulk density of claim 1. In fact, comparing Example 3 and Comparative Example 3, the volume resistivity of Example 3 having a small density is remarkably smaller than that of Comparative Example 3.

(4) Particle form

The powder of the present invention is unshaped.

On the other hand, the complex of Yamamoto has a needle shape. When such a complex having a needle shape is blended with a base material, the complex is oriented in the same direction as the movement of the base material. This tendency is particularly true in case of a thin film. As the result, the volume resistivity of the composition tends to become anisotropic.

In contrast to this, the composition comprising the powder of the present invention is not anisotropic, since primary particles can be finely dispersed in a base material even in the case of a thin film.

In addition, the composition comprising the powder of the present invention exhibits excellent transmittance, since the powder can be finely dispersed in a base

material (please see Performance Test 1 beginning on page 37 in the specification). The composition comprising the complex of Yamamoto having a needle shape is not expected to exhibit such a transmittance.

As apparent from the foregoing remarks, the electroconductive zinc oxide powder of the present invention is clearly distinct from the complex of Yamamoto, and would not have been obvious to one of ordinary skill in the art from this reference.

Turning now to a discussion of claim 2 of the present application, which has been amended to recite that firing is carried out at 300 to 600 °C, if the firing temperature is too high, zinc oxide undergoes grain growth in the firing step so that the primary particle size grows to more than 0.03 μm, and the bulk density of the aggregate exceeds 0.20 g/mL. Thus, when such powder is added to rubber, resin or the like, the dispersibility thereof becomes poor (please see page 21, lines 19-25 of the specification).

Actually, when the electroconductive zinc oxide powder was obtained by first mixing zinc oxide powder, ammonium hydrogen bicarbonate and aluminum sulfate together, and then aging the mixture, the bulk density was 0.35g/ml (please see Comparative Example 2). In addition, when the firing temperature was 800°C, the bulk density was even higher, 0.4g/ml (Comparative Example 1). The volume resistivity of these electroconductive zinc oxide powders with high bulk density is inferior (please see Table 2).

On the other hand, the electroconductive zinc oxide powders obtained by the method of the amended claim 2, for example by firing at 400 °C as in Examples 1-3, have a low bulk density of less than 0.20g/ml. In addition, the superior volume resistivity of these products is demonstrated in Tables 2 and 3.

Yamamoto describes that the firing is conducted at 500° to 1300°C, preferably 700° to 900 °C (column 7, line 45 to 53). However, the actual firing temperature in the Examples of Yamamoto is high, i.e. all of the powdery products of the Examples in Yamamoto are obtained by firing at 800 or 900 °C. Therefore, the electroconductive zinc oxide powder of Yamamoto is thought to have a higher bulk density than that of the present invention.

On page 3 of the Office Action, the Examiner takes the position that, although Yamamoto et al. does not specifically teach the claimed bulk density, it would have been

obvious to one having ordinary skill in the art at the time of the invention to optimize the bulk density of the powder since this would improve the conductive properties of the powder.

However, as indicated above, the bulk density of the powder of the present invention is lower than that of Yamamoto because the firing temperature in Yamamoto is higher than that of the present invention. As also indicated above, Applicants have shown that their firing temperature is critical to achieving a lower bulk density. Therefore, even if the Examiner takes the position that it would be *prima facie* obvious to optimize the bulk density/firing temperature, such a presumption of obviousness has been overcome by the showing of unexpected superior results (see MPEP 2144.05).

Attention is also directed to new claims 9 and 10, which are directed to firing temperature ranges that do not overlap the range disclosed by Yamamoto.

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied reference.

Therefore, in view of the foregoing amendments and remarks, it is submitted that the ground of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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September 15, 2006